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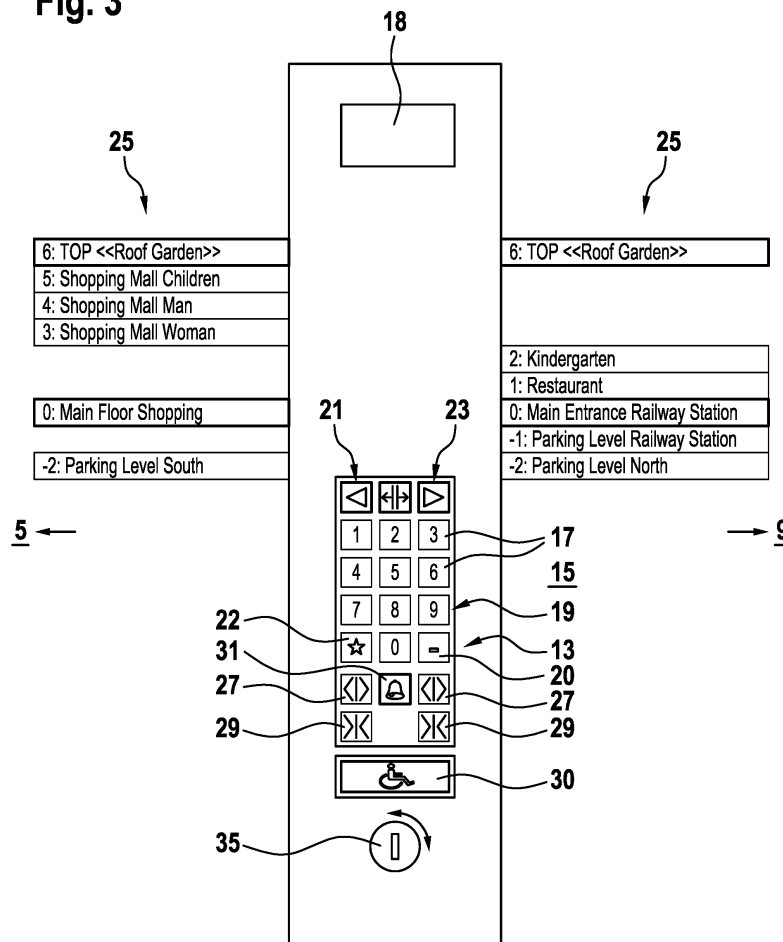
CAR OPERATING PANEL FOR AN ELEVATOR CAR HAVING AT LEAST TWO CAR DOORS

(57)

A car operating panel (13) for an elevator car (3) having at least two car doors (5, 9) is presented. The car operating panel (13) comprises a decimal keyboard (19) for inputting a selectable destination floor number, and

at least two door selection buttons (21, 23) for inputting a door selection indicating which one of the car doors (5, 9) is to be opened upon reaching a selected destination floor.

Fig. 3



Description

[0001] The present invention relates to a car operating panel (COP) for an elevator car having at least two car doors and to an elevator comprising such car operating panel.

[0002] Elevators generally comprise one or more elevator cars, sometimes also referred to as cabins. The elevator car comprises at least one car door via which passengers may access or exit the elevator car. An opening action or closing action of the car door is generally controlled by an elevator controller.

[0003] In some applications, the elevator car comprises more than one car door. For example, a front door may be provided for enabling access to a first building area whereas a rear door may be provided for enabling access to a second building area, both the first and the second building areas being arranged at same levels or floors but at different locations with respect to the elevator.

[0004] Typically, a car operating panel is provided within the elevator car as a human-machine interface via which passengers may input a selected destination floor to which the elevator car shall travel.

[0005] In elevators having more than one car door, it may be beneficial or even be required by regulations that only one door is opened at a time. For example, in order to avoid any air draft, it may be required that no two car doors are opened simultaneously as in such case the elevator car could generate a fluid communication between separate areas in a building, thereby enabling substantial air motions within the building. Furthermore, in emergency situations such as for example in case of a fire within an area of a building, it may be necessary to safely avoid that any car door providing access to this area of the building is opened. In another scenario, it may be intended that only access to one of the building areas is enabled by opening the associated car door whereas access to or from another building area is avoided due to the associated car door remaining closed.

[0006] Therefore, provisions may be required for enabling to determine which of the car doors is to be opened upon reaching a selected destination floor.

[0007] For such purpose, elevator cars comprising two or more car doors conventionally include a COP which comprises not only one push button for each accessible floor in a building, but one push button for each access to a floor in a building through one of the car doors. In other words, in case different areas on a same level within the building may be accessed via a front car door, on the one side, and a rear car door, on the other side, the conventional COP typically comprises two push buttons for this level in the building. Such COPs are sometimes also referred to as 1-to-1-COPs, as one button of the COP is associated to each one of possible accesses between the elevator car and an area within the building.

[0008] However, in such conventional approach, a number of push buttons may be high. Particularly in tall

buildings with a large number of levels to be served by the elevator, this may incur substantial costs both for the hardware of the COP itself as well as for example for a wiring. Furthermore, the COP may require substantial space within the elevator car.

[0009] Alternative COPs have been developed in which an intended destination floor may be indicated by a decimal keyboard. Such keyboards typically comprises at least ten keys or push buttons and are therefore sometimes referred to as ten-key pad. Specifically, the decimal keyboard may be similar to ten-key pads as conventionally used e.g. telephones or automatic teller machines. Using such decimal keyboard, any desired floor number may be input into the COP. Such COP may be relatively cheap and space saving. An example of such COP is disclosed in US 8,807,287 B2. However, such alternative COP does generally not enable selecting which of a plurality of car doors is to be opened upon reaching a destination floor.

[0010] There may be a need for a COP for an elevator car having at least two car doors, wherein the COP is specifically adapted for fulfilling the requirements in such multi-door elevator car. Preferably, the COP should be both small and inexpensive as well as the COP should enable specifically selecting which of the car doors is to be opened at an intended destination floor. Furthermore, there may be a need for an elevator comprising such COP. Such needs may be met with the subject-matter of the independent claims. Advantageous embodiments are defined in the dependent claims and in the following specification.

[0011] According to a first aspect of the present invention, a car operating panel for an elevator car having at least two car doors is proposed. The car operating panel comprises a decimal keyboard for inputting a selectable destination floor number, and at least two door selection buttons for inputting a door selection indicating which one of the car doors is to be opened upon reaching a selected destination floor.

[0012] According to a second aspect of the present invention, an elevator comprising an elevator car having at least two car doors and a car operating panel according to an embodiment of the first aspect of the invention is proposed.

[0013] Ideas underlying embodiments of the present invention may be interpreted as being based, inter alia, on the following observations and recognitions.

[0014] A COP according to an embodiment of the present invention may have a small constructed size while furthermore allowing indicating which of a plurality of car doors is to be opened upon arriving at a selected destination floor.

[0015] The proposed COP comprises a decimal keyboard, on the one hand, as well as at least two door selection buttons, on the other hand. Using the decimal keyboard, a passenger may easily enter any of a large variety of destination floor numbers which may then be transmitted from the COP for example to an elevator con-

troller which, upon receiving the entered destination floor number, may control the elevator motion to transport the elevator cabin to the selected destination floor. Furthermore, as the elevator car comprises a plurality of car doors, the additionally provided at least two door selection buttons may be used by the passenger for selecting which one of the car doors is to be opened upon reaching the selected destination floor.

[0016] Accordingly, the COP proposed herein may provide a simple device with twelve selection buttons. Therein, ten of the selection buttons are part of the decimal keyboard and typically represent the numbers or digits of "0" to "9". Two additional selection buttons may be used for indicating the door via which a passenger intends to exit the elevator car. Such COP may be of technically simple construction, small in size, cheap in manufacturing and/or simple in installation.

[0017] Generally, the selection buttons may be any type of push buttons, i.e. buttons which may be actuated by pushing or physically contacting them. For example, the selection buttons may be mechanical buttons to be depressed upon being pushed by a passenger. Alternatively, the selection buttons may be for example capacitive sensors to be actuated by e.g. an approaching finger of a passenger.

[0018] While the COP proposed herein shall comprise at least two door selection buttons, the number of door selection buttons should generally correspond to the number of car doors within the elevator car.

[0019] The decimal keyboard with its buttons and the door selection buttons may be arranged in any manner. Particularly, the sum of all buttons included in the COP should be arranged such as to be space saving. Additionally to the decimal keyboard and the door selection buttons, the COP may comprise further buttons for fulfilling official regulations and/or for increasing elevator functionality or passenger comfort.

[0020] According to an embodiment, the car operating panel is adapted to, upon a destination floor number being inputted via the decimal keyboard, determining whether floor areas may be accessed via each of the car doors at the selected destination floor and, if this is the case, wait for inputting of the door selection for a predetermined waiting period.

[0021] In other words, while the elevator car comprises two or more car doors, not both car doors may enable access to an area within the building at each of the floors of the building. Instead, there may be floors at which only one of the car doors may enable such access whereas the other car door is useless, i.e. may not be used for entering or exiting the elevator car. In other floors, both car doors may enable separate accesses to different areas within the building. Accordingly, only in the latter case, there may be a need for determining which of the car doors are to be opened upon reaching the destination floor. Therefore, only in such case, the COP should wait for any input to be performed by a passenger using the door selection buttons in order to indicate a door selec-

tion, i.e. indicate the door to be open upon arrival at the destination floor.

[0022] However, for practical reasons, such door selection should be inputted during a predetermined waiting period. Such waiting period may be determined depending on for example a typical time needed by passengers to indicate their door selection. For example, such waiting period may be 10 seconds, 5 seconds or even only 2 seconds. Specifically, the waiting period may be determined depending on a variety of influencing parameters such as a size of the elevator cabin, a nominal speed of the elevator cabin motion, a current occupancy of the elevator cabin, etc.

[0023] Furthermore, the waiting period may be stopped in case of specific events occurring. For example, the waiting period may be stopped in case another destination floor number is inputted via the decimal keyboard. In other words, a door selection may be made only as long as no further destination floor number is inputted and, as soon as such further destination floor number is inputted, the preceding waiting period is terminated and a new waiting period is started for the inputted further destination floor number.

[0024] Specifically, according to an embodiment, the car operating panel is adapted to, in case a door selection is inputted within the predetermined waiting period, indicating to an elevator controller that, upon reaching the selected destination floor, only the selected car door is opened.

[0025] In other words, when, after the passenger having inputted his intended destination floor, it was determined that for the selected destination floor, there is more than one option of opening one of the car doors, and the passenger has inputted the door selection during the waiting period, such door selection is correctly accepted by the COP. The COP then forwards the information about the selected destination floor together with the information about the selected car door towards the elevator controller. The elevator controller then controls travelling of the elevator car to the selected destination floor and, upon reaching this destination floor, controls opening only the selected car door while keeping the other car door(s) closed.

[0026] According to an embodiment, the car operating panel is adapted to, in case no door selection is inputted within the predetermined waiting period, indicating to an elevator controller that, upon reaching the selected destination floor, one of all car doors are opened and a predetermined default car door is opened, i.e. either all car doors are opened simultaneously by default or only a predetermined default number is opened.

[0027] In other words, when no door selection is inputted during the predetermined waiting period, i.e. a passenger has not decided or at least not indicated which of the car doors are to be opened upon arrival, the COP itself has some default settings indicating which of the car doors are to be opened upon lack of any passenger selection. According to such default settings, either all

car doors may be opened upon arrival or a specific one of the available car doors is opened upon arrival, such car door being referred to as default car door. For example, the default car door may be the car door which is used in most cases for exiting and/or accessing the elevator car.

[0028] According to an embodiment, the car operating panel is adapted to, during the predetermined waiting period, outputting a motivation signal for motivating a passenger to inputting the door selection via one of the door selection buttons.

[0029] In other words, after a destination floor number has been inputted into the decimal keyboard, the COP may not only passively wait for one of the door selection buttons to be actuated for indicating the intended door selection, but the COP may actively motivate a passenger to input such door selection. Such motivation may be such that for example an unexperienced passenger, who does not know the novel type of COP, intuitively understands that some further action is required from him and that, particularly, he should press one of the door selection buttons for indicating through which of the car doors he wants to exit the elevator car. In principle, the motivation signal may be any signal which may be recognised and correctly interpreted by a passenger.

[0030] For example, according to an embodiment, the door selection buttons may be adapted for being temporarily illuminated and the door selection buttons are temporarily illuminated during the predetermined waiting period for providing the motivation signal.

[0031] In other words, when waiting for the passengers door selection, the COP may motivate the passenger to make and indicate his door selection by temporarily illuminating the door selection buttons. For example, when the COP determined that, at the selected destination floor, both car doors may be used for exiting from the elevator car, the COP may initiate flashing or blinking of the door selection buttons. Upon such illumination of these door selection buttons, the passenger may intuitively understand that he has to select a car door for exiting and may then press the associated door selection button.

[0032] Alternatively, various other types of motivation signal may be outputted by the COP. In principle, such motivation signal may be any signal perceivable by a passenger, such as any visual signal or audible signal.

[0033] For example, according to an embodiment, the car operating panel may be adapted for outputting an audible prompt as the motivation signal. For example, a voice signal may be outputted via a loudspeaker and may invite the passenger for inputting his door selection via the door selection buttons

[0034] According to an embodiment, the car operating panel further comprises a key switch, wherein the car operating panel is adapted to, upon the key switch being actuated, switching to an alternative operation mode in which predetermined actions may be initiated via the car operating panel by inputting predetermined codes via the

decimal keyboard.

[0035] In other words, the COP may be specifically adapted for using its decimal keyboard not only for destination floor selection but also for other functions. For example, the COP may additionally control specific functions such as an emergency operation, a reserved operation, a prioritised operation or a light control. Therein, the emergency operation may include that for example only authorised personal may control any elevator motion during an emergency. The reserved operation may include that only authorised persons may reserve the elevator. The prioritised operation may include that authorised people may be transported in the elevator car with a higher priority compared to non-authorised people. The light control may include that for example an operation or an illumination intensity of a light source included in the elevator car may be controlled.

[0036] Conventionally, all such functions or actions may be controlled only after a person has shown that he is authorised for using such restricted functions of the elevator. Accordingly, for example key switches have been included into the COP. Therein, generally one key switch has been provided for controlling one associated function of the elevator. For example, one key switch has been provided for initiating an emergency operation whereas another key switch has been provided for initiating a prioritised operation and a third key switch has been provided for accessing light control.

[0037] In order to reduce such number of key switches, it is now suggested that only a single key switch is provided at the COP. Upon this single key switch being actuated, the COP is switched to an alternative operation mode. In this alternative operation mode, the decimal keyboard is not used anymore for inputting a destination floor selection. Instead, the decimal keyboard is used for inputting, codes each of which indicates one of a variety of predetermined actions. For example, upon inputting a first code, an authorised person may bring the elevator into its emergency operation mode. Upon inputting a second code, an authorised person may bring the elevator into its reserved operation mode, and so on.

[0038] Accordingly, using a single key switch, the COP may be used for controlling a variety of different operation modes. Therein, as the key switch may only be actuated by a person having the associated key, it may be avoided that any unauthorised person switches the COP to its alternative operation mode and controls any of the restricted predetermined actions.

[0039] It shall be noted that possible features and advantages of embodiments of the invention are described herein partly with respect to a car operating panel, particularly to a way of operating such COP, and partly with respect to an elevator comprising such COP. One skilled in the art will recognize that the features may be suitably transferred from one embodiment to another and features may be modified, adapted, combined and/or replaced, etc. in order to come to further embodiments of the invention.

[0040] In the following, advantageous embodiments of the invention will be described with reference to the enclosed drawings. However, neither the drawings nor the description shall be interpreted as limiting the invention.

Fig. 1 shows an elevator car comprising a car operating panel.

Fig. 2 shows a conventional car operating panel for an elevator car with two car doors.

Fig. 3 shows a car operating panel for an elevator car with two car doors according to an embodiment of the present invention.

[0041] The figures are only schematic and not to scale. Same reference signs refer to same or similar features.

[0042] Fig. 1 shows an elevator car 3 of an elevator 1. The elevator car 3 comprises a front car door 5 through which passengers may enter or exit the elevator car 3 from or towards a first floor area 7 in a building. Furthermore, the elevator car 3 comprises a rear car door 9 through which passengers may enter or exit the elevator car 3 from or towards a second floor area 11 in the building.

[0043] Within the elevator car 3, a car operating panel 13 is arranged at one of the sidewalls 15 of the elevator car 3. Alternatively, two or even more COPs 13 may be provided and may be arranged at one or more of the sidewalls 15 of the elevator car 3. The COP or COPs may be arranged at one or two of opposing lateral sidewalls, at a rear sidewall or at a front sidewall. The COP 13 comprises a plurality of push buttons 17 to be actuated by a passenger for destination floor selection. Furthermore, the COP 13 typically comprises a car position indicator display panel 18.

[0044] Fig. 2 shows an example of a conventional COP 13 for an elevator car 3 having two car doors 5, 9. The conventional COP 13 is of a 1-to-1 type which means that, for each of the floors in the building, one push button 17 is provided for each of the car doors 5, 9 in case the respective car door 5, 9 may be used in this floor for entering an adjacent floor area 7, 11.

[0045] In the example given, floor areas 7 may be accessed through the front car door 5 in the first, fourth, fifth and sixth floor, whereas floor areas 11 may be accessed through the rear car door 9 in the first, second, third and fourth floor. If for example the push button 17 numbered "4" on the left side of the COP 13 is actuated by a passenger, this indicates that the passenger wants to be transferred to the fourth floor and wants to exit the elevator car 3 through the front car door 5.

[0046] However, in such conventional layout of a COP 13, a large number of push buttons 17 may be required. For example, in a building having 50 floors, up to 100 push buttons may be required in order to enable selection of each of the front and rear car doors 5, 9 at each of the floors. Accordingly, the conventional COP 13 may require

substantial space and wiring efforts. Furthermore, an overview over such COP 13 may be limited.

[0047] Fig. 3 shows a COP 13 according to an embodiment of the present invention. The COP 13 comprises a decimal keyboard 19 comprising ten decimal push buttons 17 numbered with "0" to "9". Furthermore, the COP 13 comprises a push button 20 indicating "-" for inputting negative floor numbers. Additionally, the COP 13 comprises a push button 22 indicating "*" e.g. for direct reference to a lobby floor or main entrance floor. Using such decimal keyboard 19, a passenger may input a large variety of selectable destination floor numbers. For example, by pressing only two of the push buttons 17, up to 109 different floors may be selected, i.e. for example -9, -8, -7, ..., 0, 1, 2, ..., 98, 99. In principle, using such decimal keyboard 19, an infinite number of floors may be selected.

[0048] However, with the decimal keyboard 19 alone, it would no more be possible to indicate which of the front car door 5 and the rear car door 9 shall open upon arriving at a selected destination floor.

[0049] For managing this requirement, the COP 13 furthermore comprises two door selection buttons 21, 23. Using these door selection buttons 21, 23, a door selection may be inputted for indicating, which one of the car doors 5, 9 is to be opened upon reaching a selected destination floor.

[0050] In actual use of the elevator 1, a passenger having entered the elevator car 3 may first enter an intended destination floor number into the decimal keyboard 19 and may then actuate one of the door selection buttons 21, 23 for selecting the car door 5, 9 through which he wants to exit the elevator car 3 upon reaching the destination floor.

[0051] For simplifying the use of the elevator 1, a list 25 of all accessible floors and floor areas 7, 11 within the building may be provided next to the COP 13. Therein, this list 25 may be separated into two portions, one portion being closer to the front car door 5 and indicating the floor areas 7 being accessible through this front car door 5 at a respective floor and the other portion being closer to the rear car door 9 and indicating the floor areas 11 being accessible through this rear car door 9 at a respective floor.

[0052] It may be noted that, while the proposed COP 13 may be particularly beneficial in tall buildings having a large number of floors, the example shown in Fig. 3 includes only 9 floors for simplification of visualisation.

[0053] For further simplifying the operation of the COP 13, the COP 13 may be adapted to, first, wait for a destination floor number to be inputted by a passenger via the decimal keyboard 19. Then, the COP 13 may determine whether there is only one floor area 7, 11 at the selected destination floor to be accessed by only one of the front and rear car doors 5, 9 or whether there are two floor areas 7, 11 each to be accessed via one of the front and rear car doors 5, 9.

[0054] In the first case, the COP 13 may simply forward

the inputted destination floor number towards an elevator controller which may then control bringing the elevator car 3 to the selected destination floor.

[0055] In the second case, the COP 13 may additionally wait for a door selection to be inputted. Generally, such door selection may be inputted during a predetermined waiting period of for example five seconds. If the passenger actuates one of the door selection buttons 21, 23 associated to one of the front and rear car doors 5, 9, this information is forwarded to the elevator controller. The elevator controller will then, upon arriving at the selected destination floor, open only the selected one of the front and rear car doors 5, 9.

[0056] In case, a destination floor number has been inputted through the decimal keyboard 19, but then no door selection has been made by actuating one of the door selection buttons 21, 23, the elevator controller may follow a default mode in which for example both car doors 5, 9 are opened simultaneously or only a predetermined default car door, for example only the front car door 5, is opened.

[0057] In order to support intuitive use of the COP 13, the door selection buttons 21, 23 may be arranged and/or marked in an intuitive way. For example, the door selection button 21 for selecting the front car door 5 may be arranged closer to this front car door 5 and/or may comprise for example an arrow directing towards the front car door 5, whereas the door selection button 23 for selecting the rear car door 9 may be arranged closer to this rear car door 9 and/or may comprise an arrow directing to the rear car door 9. Additionally or alternatively, written texts such as "front door" and "rear door" (or "left door" and "right door") may be provided at or near to the respective door selection buttons 21, 23. Additionally, corresponding text may be provided with Braille dots, if required.

[0058] In order to indicate that the COP 13 waits for some door selection, a motivation signal may be generated by the COP 13 upon a destination floor having been selected and it has been determined that, in the selected destination floor, both car doors 5, 9 could be used. For example, such motivation signal could be implemented by illuminating the door selection buttons 21, 23 during the waiting period. The illumination could be continuous or might be flushing or blinking. Alternatively, different types of motivation signals could be generated. For example, a voice message could be issued in forming "please select front or rear door opening".

[0059] Additionally to the decimal keyboard 19 and the door selection buttons 21, 23, further push buttons may be provided at the COP 13. For example, a door-open push button 27 may be provided for each of the front car door 5 and the rear car door 9. The COP 13 may be configured such that such door-open push button 27 may be actuated in order to e.g. open one of the doors 5, 9 in cases, where the car 3 arrived at a destination floor and the passenger realizes that a wrong car door 5 was selected and wants to open the other car door 9.

[0060] Similarly, door-close push buttons 29 may be provided. Furthermore, an alarm push button 31 and a push button 33 for handicapped people (blue wheelchair button) may be provided. If special buttons or floor designations are required, e.g. B1, B2, BAR, Sky lobby, etc., they may be provided additionally at the COP 13 and may be placed for example separately below the decimal keyboard. Such buttons may then establish direct calls to the relevant floors (e.g. B1 corresponds to "-1").

[0061] Finally, the COP 13 may further comprise a key switch 35. The key switch 35 may only be activated by an authorised person having the correct key. If the key switch 35 is actuated, the COP 13 is switched to an alternative operation mode in which predetermined actions may be initiated. In such alternative operation mode, various predetermined codes may be entered via the decimal keyboard 19. Each of such predetermined codes refers to a specific function or action to be initiated. For example, by unlocking and turning the key switch 35 and then entering a respective code, an emergency operation, a reserved operation or a prioritised operation may be initiated or a light intensity within the elevator car 3 may be modified.

[0062] Finally, it should be noted that the term "comprising" does not exclude other elements or steps and the "a" or "an" does not exclude a plurality. Also elements described in association with different embodiments may be combined. It should also be noted that reference signs in the claims should not be construed as limiting the scope of the claims.

List of reference signs

[0063]

1	elevator
3	elevator car
5	front car door
7	first floor area
9	rear car door
11	second floor area
13	car operating panel
15	elevator side wall
17	decimal push buttons
18	car position indicator display panel
19	decimal keyboard
20	"-" push button
21	door selection button
22	"" push button
23	door selection button
25	list of accessible floors
27	door-open push button
29	door-close push button
31	alarm push button
33	push button for handicapped people
35	key switch

Claims

1. Car operating panel (13) for an elevator car (3) having at least two car doors (5, 9), the car operating panel (13) comprising:

a decimal keyboard (19) for inputting a selectable destination floor number, and

at least two door selection buttons (21, 23) for inputting a door selection indicating which one of the car doors (5, 9) is to be opened upon reaching a selected destination floor.

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2. Car operating panel of claim 1, wherein the car operating panel (13) is adapted to, upon a destination floor number being inputted via the decimal keyboard (19), determining whether floor areas (7, 11) may be accessed via each of the car doors (5, 9) at the selected destination floor and, if this is the case, wait for inputting of the door selection for a predetermined waiting period.

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3. Car operating panel of claim 2, wherein the car operating panel (13) is adapted to, in case a door selection is inputted within the predetermined waiting period, indicating to an elevator controller that, upon reaching the selected destination floor, only the selected car door (5, 9) is opened.

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4. Car operating panel of one of claims 2 and 3, wherein the car operating panel (13) is adapted to, in case no door selection is inputted within the predetermined waiting period, indicating to an elevator controller that, upon reaching the selected destination floor, one of all car doors (5, 9) are opened and a predetermined default car door (5, 9) is opened.

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5. Car operating panel of one of claims 2 to 4, wherein the car operating panel (13) is adapted to, during the predetermined waiting period, outputting a motivation signal for motivating a passenger to inputting the door selection via one of the door selection buttons (21, 23).

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6. Car operating panel of claim 5, wherein the door selection buttons (21, 23) may be temporarily illuminated and wherein the door selection buttons (21, 23) are temporarily illuminated during the predetermined waiting period for providing the motivation signal.

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7. Car operating panel of claim 5, wherein the car operating panel (13) is adapted for outputting an audible prompt as the motivation signal.

8. Car operating panel of one of the preceding claims, further comprising a key switch (35), wherein the car operating panel (13) is adapted to, upon the key switch (35) being actuated, switching to an alternative operation mode in which predetermined actions may be initiated via the car operating panel (13) by inputting predetermined codes via the decimal keyboard (19).

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9. Elevator (1) comprising an elevator car (3) having at least two car doors (5, 9) and a car operating panel (13) according to one of the preceding claims.

Fig. 1

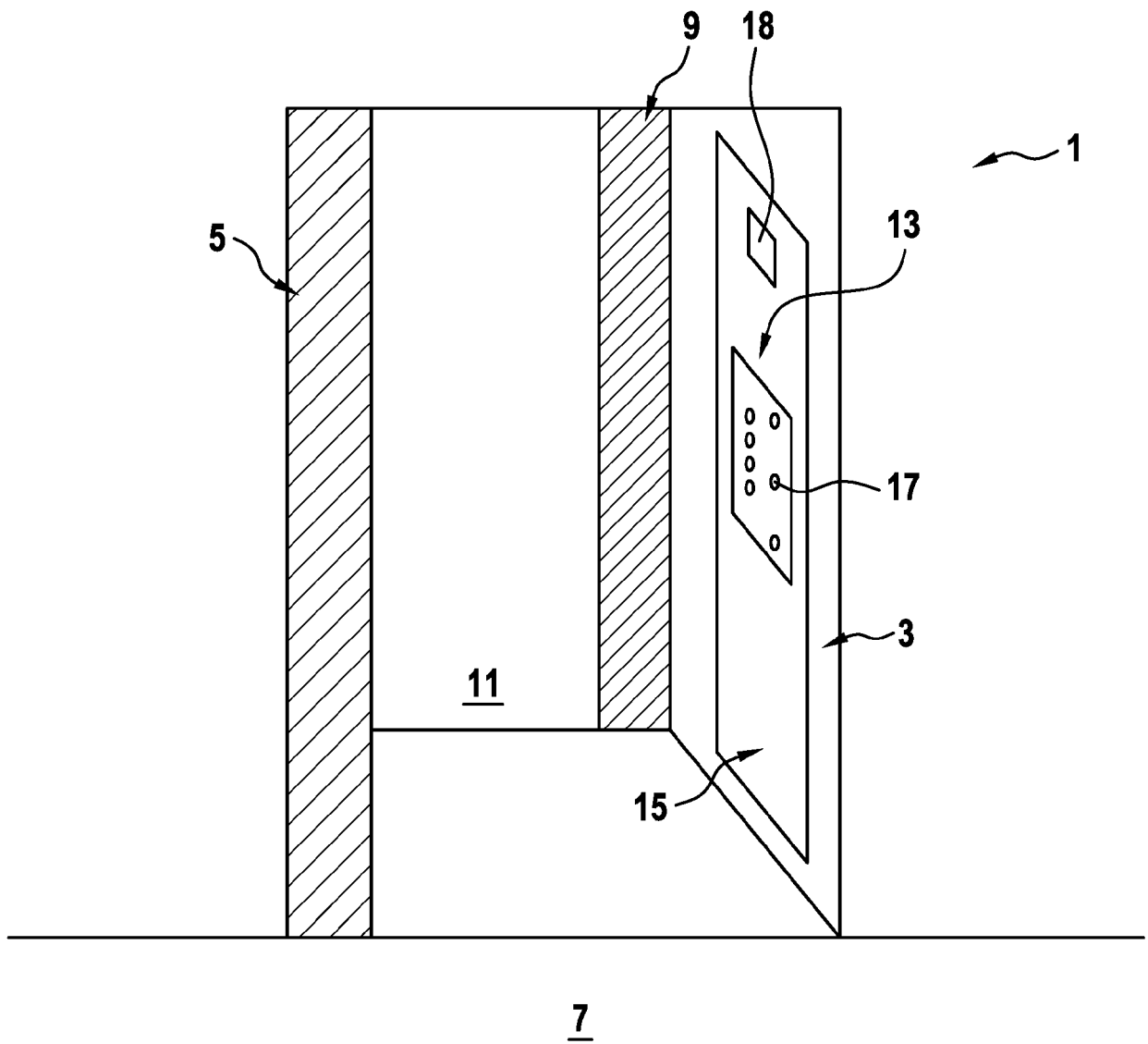


Fig. 2

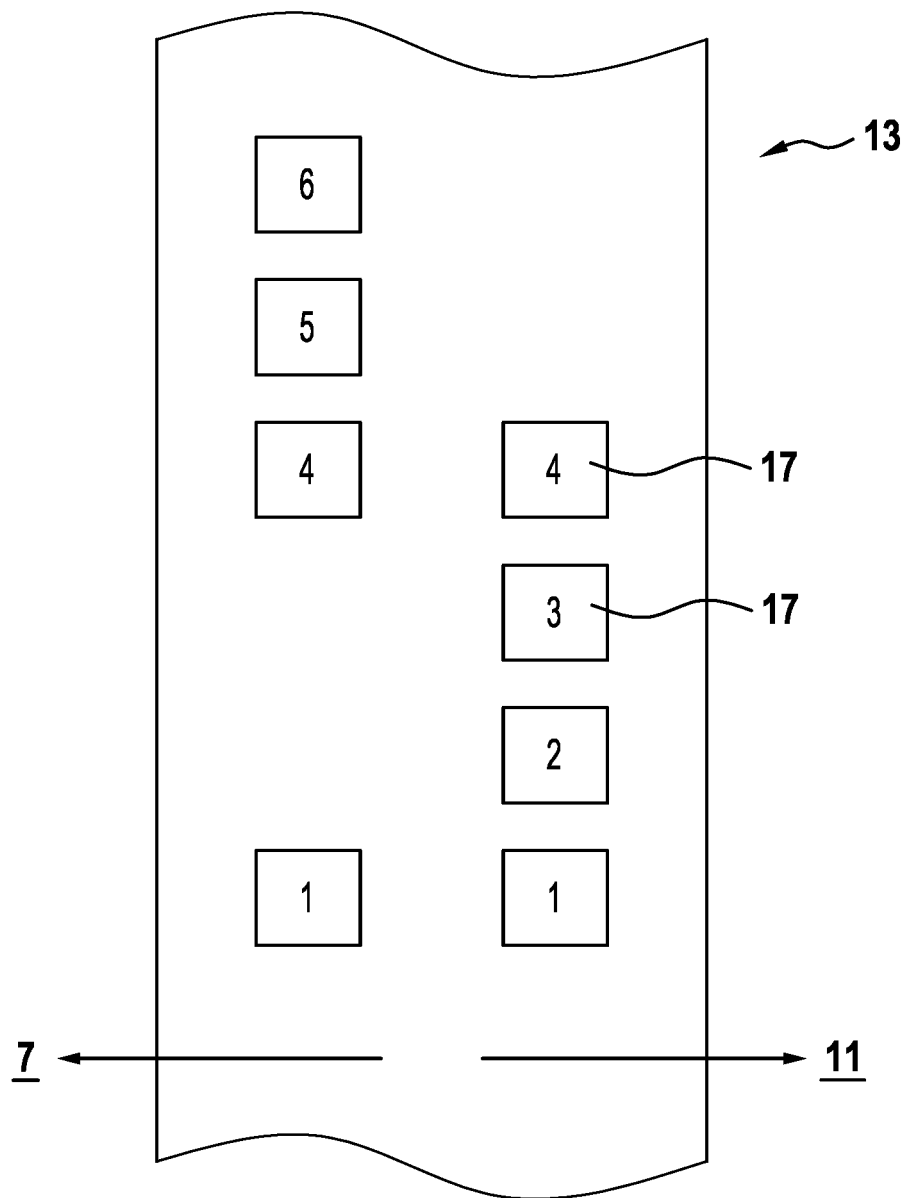
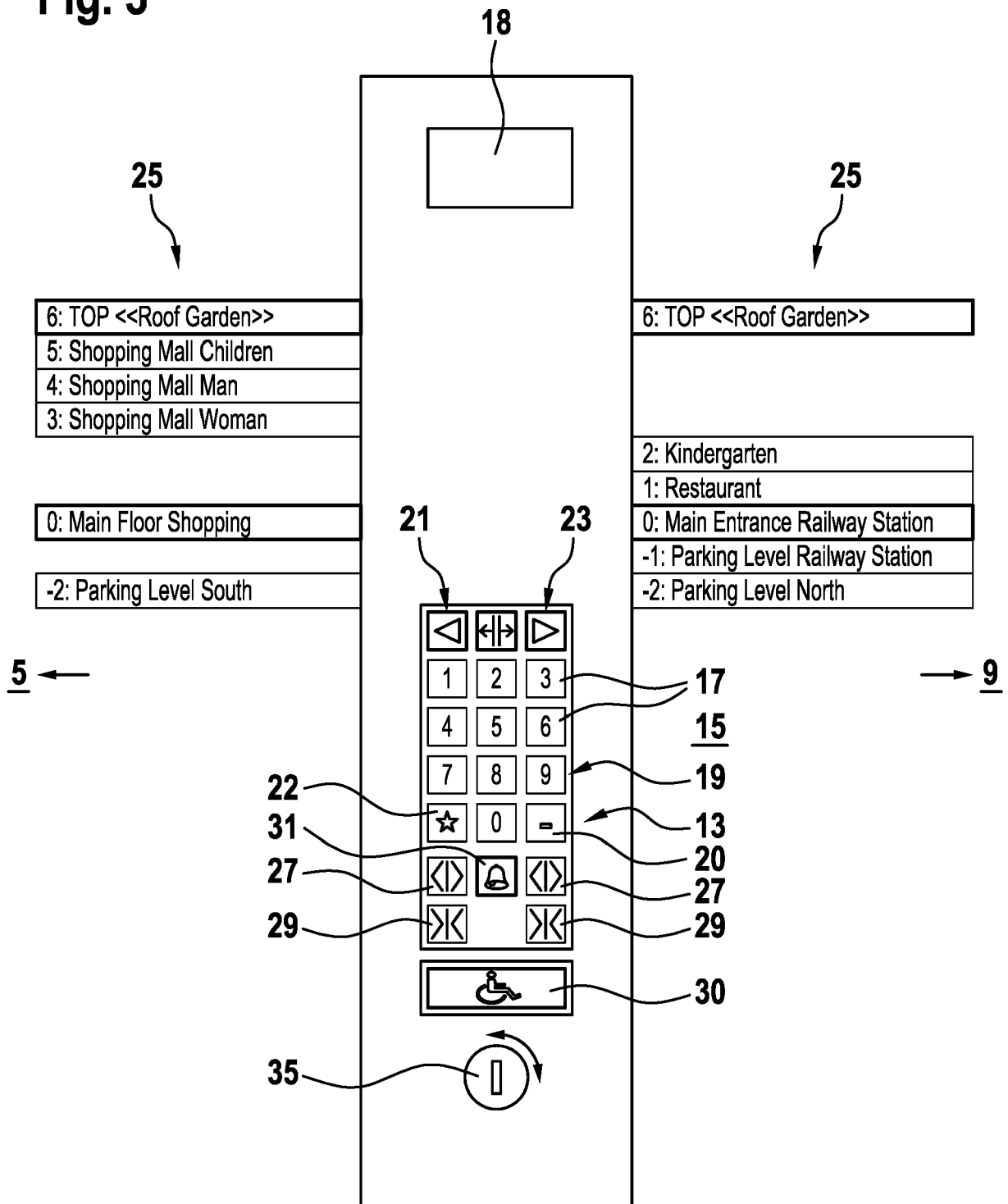


Fig. 3





EUROPEAN SEARCH REPORT

Application Number
EP 17 17 0707

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP 3 924030 B2 (MISAWA HOMES CO) 6 June 2007 (2007-06-06)	1,2,8,9	INV. B66B1/46 B66B13/14
A	* paragraph [0031] - paragraph [0035] * * figures 1, 2 *	3-7	

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A	* abstract * * paragraph [0015] - paragraph [0024] * * figures 2, 3 *	5-8	

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A	* abstract * * figures 1-9 *		

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	* abstract * * figures 1-20 *		

The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 11 October 2017	Examiner Dijoux, Adrien
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 17 17 0707

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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